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## ABSTRACT

Forty elderly adults were required to memorize a list of 15 simple nouns belonging to three separate categories. The arrangement of the list of nouns (randomized or completely categorized) and instructions (instructed that the nouns could be in terms of categories or not instructed) were manipulated as factors. Individuals participating in the categorized-instruction condition recalled an exceptionally high percentage of nouns and demonstrated a high degree of category clustering of those nouns. The results of the study were interpreted as indicating that the elderly person's performance when dealing with to-be-recalled stimulus material varies as a function of the organizational demands placed upon him.  
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THE EFFECTS OF PRESENTATION VARIABLES UPON CLUSTERING  
AND RECALL PERFORMANCE IN THE ELDERLY

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THE EFFECTS OF PRESENTATION VARIABLES UPON CLUSTERING AND RECALL  
PERFORMANCE IN THE ELDERLY

Recent research on memory processes in the elderly has suggested that the often-observed decrement in performance with advancing age may be related to a change in the manner in which information is integrated or organized, rather than a change in absolute processing capacity (e.g., Craik, 1968). It appears that the elderly do not readily integrate newly presented stimulus material (Gilbert & Levee, 1971) and do not spontaneously use mnemonic devices (Goulet, 1972; Hulicka & Grossman, 1967; Riegel, 1965). In addition, Rabbitt (1964) and Rabbitt & Birren (1967) report that the elderly do not abstract economical rules of classification when required to recall stimuli according to pre-established patterns. Finally, Denney (1974) has shown that, in contrast to middle aged people, the elderly do not show any significant amount of clustering of either complementary or similar stimulus items in immediate free recall.

In general, these findings suggest that the elderly do not organize incoming information in an efficient manner. It may be that the inferior performance of the elderly on memory tasks should be viewed within the context of a distinction between competence and performance (see Flavell & Wohlwill, 1969, and Hornblum & Overton, 1976). It is not clear whether the elderly are incapable of logically structuring incoming information (a competence problem), or whether their inefficiency is a performance problem that occurs as a function of the manner in which information is presented. Thus, there remains a need to systematically manipulate task parameters to determine if, under particular conditions, competence can be demonstrated.

The purpose of the present study was to examine the effects of the manner in which information is presented upon recall and clustering performance in the elderly. It was hypothesized that if the elderly do not possess the logical competence to discern and use relationships among word list items, increasing the salience of list organization through manipulations of instructions and list structure should have no effect upon their: (1) recall, and (2) clustering performance.

## METHOD

### Subjects and Design

Forty volunteers, ranging in age from 54 to 82 years ( $M = 68.2$ ;  $SD = 6.5$ ) participated in the study. All individuals were living at home and participated in activities at a Senior Center in Toledo, Ohio. Pretesting established that all volunteers were free of significant auditory, visual or reading impairments.

The study employed a  $2 \times 2$  factorial design with list arrangement (random or completely categorized) and instructions (instructed that word items could be organized in terms of categories or not instructed) as factors. Ten individuals were randomly assigned to each of the four experimental conditions.

### Stimulus Materials

Two separate word lists, a pretest and an experimental list were generated. Each list was composed of 15 one- and two-syllable nouns. All words were selected to minimize repetitions of initial letters and rhymes.

The words on the pretest list had a mean estimated frequency of 107

occurrences per million according to the norms of Carroll, Davies & Richman (1971), and 100 occurrences per million according to the Thorndike & Lorge (1944) norms. No two of the word items were members of the same category, and none of the items was semantically related to items on the experimental word list.

The words on the experimental list had a mean estimated frequency of 93 occurrences per million according to the norms of Carroll, et. al. (1971), and 93 occurrences per million according to the Thorndike & Lorge (1944) norms. The experimental list consisted of five words from each of three categories: professions, animals and articles of clothing. The experimental words were arranged in either random or categorized order. In the categorized list, word items were arranged serially by category. In the randomized list, word items were arranged in a random order under the restriction that no item was followed by another item from the same category. Both the categorized and the randomized word lists were arranged in blocks of five words, and the order of block presentation was counterbalanced across participants.

### Procedure

Volunteers were tested individually in sessions lasting approximately 15 minutes. All stimuli were presented for 5 seconds each on a Stowe memory drum. The interstimulus interval was 5 seconds. Each stimulus word in both the pretest and experimental conditions was presented once.

In order to insure that all participants could properly hear the experimenter's instructions, as well as see and pronounce the stimulus items, all participants were shown the pretest list and were instructed to pronounce each word as it was presented. In order to minimize pretest word intrusions during the experimental

session, participants were instructed not to attempt to recall any of the pretest words. Three participants, who displayed noticeable visual and reading problems, were replaced.

Following the presentation of the last word on the pretest list, the experimental session was initiated. All participants were told to pay careful attention to all of the experimental words since they would be required to recall them later. In addition, one-half of the participants were instructed that the list could be organized according to the three supraordinate categories specified above. Participants were asked to pronounce each of the experimental words out loud as they were presented. Following the presentation of the last word, all participants were provided with a pencil and a blank sheet of paper, and were instructed to write down as many of the experimental words as they could recall in any order that they wished. The testing session ended when the participant indicated that he could recall no more words.

## RESULTS AND DISCUSSION

The mean number of words recalled for participants in each condition is presented in Table 1. An analysis of variance revealed a significant main effect for list arrangement,  $F(1,36) = 7.89, p < .01$ , with more words recalled when the list was categorized. The main effect for instructions was not significant,  $F(1,36) = .96$ , but the Instruction x List Arrangement interaction was significant,  $F(1,36) = 6.74, p < .01$ .

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Insert Table 1 About Here

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Since differences were observed in the mean number of words recalled across conditions, a measure of clustering which accounted for differences in recall was used. This measure involved a Z-score comparison of the runs of words each participant recalled from the experimenter-defined categories with the expected number of such runs for the experimental word list (see Cole, Frankel & Sharp, 1971).

The mean Z-scores for each condition are presented in Table 1. The smaller the Z-score, the greater the amount of clustering. An analysis of variance performed on the Z-score data revealed a significant main effect for list arrangement,  $F(1,36) = 22.04$ ,  $p < .01$ , with the categorized lists producing a greater degree of clustering than the randomized lists. The main effect for instructions was marginally significant,  $F(1,36) = 3.26$ ,  $p < .10$ , indicating a tendency for greater clustering to occur when participants were instructed regarding the presence of categories. The interaction was not significant,  $F(1,36) = .362$ .

These results indicate that word lists in which items were arranged according to categories consistently produced recall of a greater percentage of words, and more clustering of those recalled words. Three of the 20 participants in the categorized conditions demonstrated 100 percent recall, and 11 of the 20 obtained the minimum possible Z-score for clustering. These data imply that the elderly people who participated in this study were not actively organizing the word lists to facilitate recall performance, but were able to use list organization to their advantage if it was provided for them.

Instructing the participants in this study about the presence of the three supraordinate categories clearly did not have the same effect on recall performance as did manipulating word list arrangement. In fact, instructions had a facilitative

effect on performance only for participants in the categorized condition. Individuals in the categorized-instructed condition recalled an exceptionally high percentage of words ( $M = 84.5\%$ ).

In the categorized-instructed condition, participants were informed of the existence of the categories, and the items were already sorted into those categories, so that all effort could be directed toward memorizing the items. Participants in the other conditions had the additional tasks of recognizing the existence of the categories and/or sorting the items into those categories. The time expended by these individuals in recognizing and sorting items could be spent in memorization of those items by individuals in the categorized-instructed condition. This may have caused the recall scores of the participants in the other conditions to be depressed relative to the recall scores of the participants in the categorized-instructed condition.

In summary, the results of this study indicate that the relatively poor performances of elderly individuals on tasks which require the organization of information should not always be attributed to incompetence in integrating stimulus material. The elderly person's performance when dealing with stimulus material which is to be recalled may vary as a function of the organizational demands placed upon the individual.



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TABLE 1

Summary Data For Participants In All Conditions

<u>Condition</u>	<u>Mean Percent Recall</u>	<u>Mean Clustering (Z) Scores</u> <sup>1</sup>
Categorized-Instructed	84.50 (18.16)	-1.56 (.080)
Categorized-Not Instructed	62.60 (19.86)	-1.36 (.254)
Randomized-Instructed	51.40 (16.95)	-1.12 (.363)
Randomized-Not Instructed	61.30 (18.40)	-1.02 (.310)

Note: The numbers in parentheses are the group standard deviations.

<sup>1</sup>These numbers represent average Z-scores, as is described in the text.